

Osteoid Osteoma of the Distal Ulna: A Rare Location and Diagnostic Challenge - Case Report

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Abstract

Case Report

Background: Osteoid osteoma is a benign bone-forming tumor accounting for approximately 10–12% of all benign bone tumors. While it most commonly affects the long bones of the lower extremity, localization at the distal ulna is exceedingly rare, representing less than 1% of reported cases. Atypical locations frequently cause significant diagnostic delays due to unusual clinical and imaging presentations. **Case presentation:** We report a 40-year-old female patient with an 11-month history of chronic wrist pain without prior trauma. Radiographs revealed subtle osteosclerosis at the distal ulna. Computed tomography (CT) demonstrated a hypodense nodular lesion with a peripheral osteosclerotic reaction consistent with osteoid osteoma. Complete surgical excision was performed, and histopathological examination confirmed the diagnosis. The patient achieved complete pain resolution and full functional recovery at three months postoperatively. **Conclusions:** Osteoid osteoma of the distal ulna is a diagnostic pitfall due to its rarity. CT scan in thin sections remains the most specific imaging modality, and MRI provides complementary information regarding perilesional edema. Complete surgical excision is curative. This case underscores the importance of including osteoid osteoma in the differential diagnosis of unexplained chronic wrist pain in young patients.

Keywords: osteoid osteoma; distal ulna; computed tomography; benign bone tumor; surgical excision; wrist pain; CARE guidelines.

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INTRODUCTION

Osteoid osteoma is a benign, vascularized bone-forming tumor first described by Jaffe in 1935. It is defined by a central nidus of less than 2 cm, composed of hypervascularized osteoid tissue surrounded by reactive sclerotic bone. The tumor accounts for approximately 10–12% of all benign bone tumors and 2–3% of all primary bone tumors [1,2]. It predominantly affects adolescents and young adults, with a male-to-female ratio of approximately 2–3:1.

The most common locations are the long bones of the lower extremities, particularly the femur (30%) and tibia (25%), with upper extremity involvement being comparatively rare [3,4]. Localization at the distal ulna is exceptional, reported in fewer than 1% of published series [1,5]. This anatomical rarity often leads to significant diagnostic delays and confusion with other

pathological processes, including inflammatory arthritis, stress fractures, or osteomyelitis.

The classic clinical presentation consists of nocturnal pain relieved by aspirin or non-steroidal anti-inflammatory drugs (NSAIDs). However, atypical locations particularly in periarticular regions can produce atypical symptoms including joint swelling, restricted range of motion, and referred pain that misleads the clinician [5,6].

We report a case of histologically confirmed osteoid osteoma at the distal end of the ulna in a female patient, with the aim of highlighting the diagnostic difficulties associated with this rare location and reviewing the current evidence regarding imaging strategies and treatment options. This report follows the CARE (Case Report) guidelines [7].

CASE PRESENTATION

Patient information:

A 40-year-old left-handed female patient, with no relevant past medical or surgical history and no history of trauma, presented with an 11-month history of progressive, chronic pain located just above the left wrist. The pain was described as constant, worsening at night, and partially limiting daily activities. There was no history of fever, weight loss, or systemic symptoms. The

patient had received multiple courses of analgesic and physical therapy without significant or durable relief.

Clinical findings:

Physical examination revealed point tenderness on palpation over the distal third of the left ulna. There was no palpable mass, local erythema, or skin changes. Wrist range of motion was preserved but painful in extreme positions. Neurovascular examination of the upper extremity was normal. Figure 1 shows the clinical aspect at presentation.



Figure 1: Clinical appearance of the left forearm and wrist at presentation, demonstrating no visible deformity or swelling

Diagnostic assessment:

Standard anteroposterior (AP) and lateral radiographs of the left forearm demonstrated subtle focal osteosclerosis at the distal third of the ulna, raising

suspicion for a bone lesion (Figure 2). In comparison with the contralateral side, subtle periosteal changes were apparent.



Figure 2: Standard radiograph of the left forearm: (a) anteroposterior view and (b) lateral view. Focal osteosclerosis at the distal ulna with subtle periosteal reaction and cortical sclerosis is visible

CT of the wrist and forearm in thin contiguous sections (1 mm slices) demonstrated a well-defined hypodense nodular lesion at the distal ulna, measuring approximately 8 mm in diameter, with a surrounding

peripheral osteosclerotic reaction—a classic appearance of osteoid osteoma nidus (Figure 3). The lesion did not extend into the adjacent joint space.



Figure 3: CT scan of the left forearm. Hypodense nodular nidus at the distal ulna with surrounding cortical osteosclerosis, consistent with osteoid osteoma

MRI was not performed in this case, as the CT findings were sufficiently characteristic for diagnosis. Laboratory workup including complete blood count, C-reactive protein, and erythrocyte sedimentation rate were within normal limits, effectively excluding infectious etiology.

Informed consent:

Written informed consent was obtained from the patient for publication of this case report and accompanying images. No patient-identifying information is included.

Therapeutic intervention:

Following multidisciplinary discussion, complete surgical excision of the lesion was planned.

Under general anesthesia and tourniquet control, a direct approach to the distal ulna was performed. The lesion was identified intraoperatively as a well-demarcated firm nodule embedded in the cortical bone. En bloc excision of the nidus with a surrounding margin of sclerotic bone was achieved.

Histopathological findings:

Macroscopic examination revealed a small reddish-brown nodule (Figure 4). Histopathological analysis confirmed the diagnosis of osteoid osteoma, showing a central nidus composed of interconnected trabeculae of woven bone and osteoid, surrounded by highly vascular loose fibrous stroma, with peripheral reactive lamellar bone sclerosis. No features of malignancy were identified.

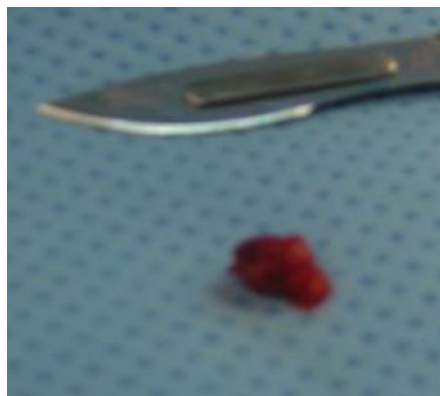


Figure 4: Macroscopic specimen: the excised nidus appears as a small, well-demarcated reddish-brown nodule embedded within sclerotic cortical bone

Follow-up and outcomes:

The patient was followed up at 6 weeks, 3 months, and 6 months postoperatively. At the 3-month follow-up, the patient reported complete resolution of pain with full resumption of daily and professional activities. No wound complications, neurovascular deficits, or signs of local recurrence were observed. Repeat radiographs at 6 months showed progressive remodeling of the surgical site without evidence of recurrence.

DISCUSSION

This case illustrates the diagnostic challenge posed by osteoid osteoma in atypical locations, particularly the distal ulna. Several important lessons emerge from this case that are directly applicable to clinical practice.

Epidemiology and atypical localization:

Osteoid osteoma represents 10–12% of benign bone tumors, with a strong predilection for the femur and

tibia, which together account for approximately 75% of cases [2,3]. Upper extremity involvement is less common, and localization at the distal ulna has been reported in fewer than 1% of cases [1]. Periarticular and intraarticular locations are associated with greater diagnostic difficulty due to the predominance of joint symptoms and the absence of the classic perilesional sclerosis on plain radiographs [5,8].

Clinical presentation:

The hallmark of osteoid osteoma is nocturnal pain relieved by aspirin or NSAIDs, attributed to prostaglandin-mediated sensitization of pain fibers in the nidus [3,9]. However, in our patient, the pain lacked a specific temporal pattern and was not significantly relieved by analgesics. This atypical presentation, combined with the unusual location, contributed to an 11-month diagnostic delay. Clinicians should maintain a high index of suspicion for osteoid osteoma in young patients presenting with unexplained chronic wrist or forearm pain, even in the absence of classic features.

Imaging workup:

Plain radiographs may appear normal or show only subtle findings in cortical and periarticular locations, as observed in our case. CT scan in thin (≤ 1 mm) sections remains the gold-standard diagnostic modality, with a sensitivity exceeding 90% for identifying the nidus and surrounding sclerosis [7,10]. Chai *et al.*, described a broad spectrum of CT appearances and emphasized that atypical presentations are more common in extra-articular upper extremity locations [10].

MRI provides complementary information, particularly useful in equivocal cases, by demonstrating perilesional bone marrow edema and soft tissue reaction appearing as hyperintense signal on T2 and fat-suppressed sequences [8,11]. The nidus enhances markedly after intravenous gadolinium administration, while the calcified central part and peripheral sclerosis remain hypointense [9,11]. Assoun *et al.*, demonstrated a significant correlation between the extent of edematous reaction on MRI and prior anti-inflammatory use [9]. In cases with atypical clinical or CT findings, MRI should be performed to confirm the diagnosis and exclude alternative pathology such as Brodie's abscess or stress fracture [12].

Treatment options:

Multiple treatment modalities are available for osteoid osteoma. Conservative management with NSAIDs may lead to spontaneous resolution over several years but is associated with significant morbidity due to prolonged pain [3]. Surgical en bloc resection, as performed in our case, is the definitive curative treatment, providing immediate pain relief and minimal recurrence risk when the nidus is completely excised [6,13]. Minimally invasive alternatives include CT-guided percutaneous radiofrequency ablation (RFA),

which has become the preferred technique in many centers due to its effectiveness (success rates $>90\%$) and low complication profile [14,16], although rare local recurrences after ablation have been reported [15]. Percutaneous drilling-resection under CT guidance and alcoholization are additional options described in the literature [13,17]. The choice of technique should account for lesion location, surgeon experience, and patient preference.

Negative scintigraphy - A diagnostic pitfall:

Bone scintigraphy classically demonstrates a focal area of increased uptake ("double density sign") in osteoid osteoma. However, as discussed in the literature, negative scintigraphy does not exclude the diagnosis. The main explanations include technical errors, insufficient radiopharmaceutical dose, or reduced osteoblastic activity in the nidus [3,6]. CT should therefore be performed in any clinically suspicious case regardless of scintigraphic findings.

CONCLUSION

Osteoid osteoma of the distal ulna is a rare entity that poses significant diagnostic challenges. In young patients presenting with unexplained chronic wrist pain, osteoid osteoma must be included in the differential diagnosis even when radiographs appear normal or equivocal. CT in thin sections is the most specific imaging modality, and when findings are uncertain, MRI should be added to the workup. Complete surgical excision achieves definitive cure with negligible recurrence risk. Minimally invasive techniques such as CT-guided radiofrequency ablation represent viable alternatives and should be considered based on lesion accessibility and institutional expertise.

Ethical Statement

This study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from the patient prior to publication. Institutional review board approval was not required for this case report at our institution.

Conflicts of Interest: The authors declare no conflicts of interest.

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